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a digest of timely information

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A Study of the Toxicity of Atabrine Dihydrochloride (Quinacrine Hydrochloride): It has been observed that many patients experiencing recurrent attacks of malaria fear that atabrine is a dangerous drug and that its use may result in some mental derangement, or severe hepatic damage with jaundice. A few of these patients confessed that these ideas were of their own imagination or the result of hearsay, while others stated that such reasoning had been suggested indirectly by their medical officers while they were overseas. Undoubtedly, most of these erroneous ideas resulted from the assumption that

all jaundice observed by these men among their associates, whatever its cause, was the direct result of the atabrine which almost everyone in the South Pacific area has taken as a suppressive measure. The desire to be able to correct these deep-rooted conceptions of the toxicity of atabrine, together with the scarcity of clinical observations on the toxicity of the drug, prompted the present study. Other purposes of this clinical study were to observe the effects in humans of large doses of atabrine and, in particular, the effect on the hepatic parenchyma. In addition, the effect was observed on the clinical course of malaria of large doses of atabrine administered early. It was hoped that the results of such a study might dispel the distrust of atabrine held by many men in military service and by many physicians.

Recently, it has been shown that atabrine, if given to dogs in doses sufficient to maintain a plasma level of 1,000 micrograms per liter for a period of three months, will produce hepatic necrosis. The usual therapeutic regimen (300 mg. each day) results in an average plasma level of 50 micrograms per liter. Theoretically, a dose of atabrine sufficient to produce hepatic damage is at least ten times the therapeutic dose.

In an excellent study of the problem, Bisphan reviewed data on 49,681 cases of malaria in which atabrine had been administered. In only thirty-eight of these was there a severe toxic reaction. The usual untoward reaction reported is a gastrointestinal disturbance, which may include vomiting, diarrhea, anorexia or epigastric pain. These symptoms are usually very mild and transient and are, as reported by some investigators, less frequent if from 10 to 15 grains (0.65 to 1 Gm.) of sodium bicarbonate are given with each dose of atabrine. Mild depression and temporary psychosis also may occur, but recent reliable reports indicate that the incidence of atabrine psychosis may be placed tentatively at less than 0.1 per cent. Exfoliative erythroderma, giant urticaria and toxic exanthems have been reported to occur after administration of atabrine, but it is well to remember that dermatological manifestations may occur in malaria per se.

Fifty white men between the ages of nineteen and thirty-five years were employed in this study. All of these subjects had had malaria with from four to thirty relapses, averaging 9.7 attacks. Of the fifty subjects, thirty-seven did not give any history of jaundice accompanying previous attacks of malaria, eight had had very slight or mild jaundice accompanying previous attacks of malaria and five had a history of having had severe, acute "infectious hepatitis". None of these patients had received atabrine for at least two weeks prior to this study.

A schedule of doses was adopted in this study to insure an initial high blood level of atabrine and to see if such comparatively large doses acted as an hepatoxic agent. The drug was given by mouth after meals, and the schedule of administration of atabrine shown in the following table was employed in all cases.

SCHEDULE OF ADMINISTRATION OF ATABRINE IN A TEN-DAY PERIOD TO EACH PATIENT

Day	Total Amount of Atabrine Administered in a Day	Number and Size of Doses
1	0.8 Gm.	2 of 0.4 Gm.
2	0.6 Gm.	3 of 0.2 Gm.
3	0.6 Gm.	3 of 0.2 Gm.
4	0.5 Gm.	2 of 0.25 Gm.
5	0.5 Gm.	2 of 0.25 Gm.
6 through 10	0.3 Gm. (daily)	3 of 0.10 Gm.
Total 10 days	4.5 Gm.	

Laboratory procedures: Prior to the administration of atabrine and again at the completion of the ten-day course of therapy, the following laboratory procedures were carried out in all cases: (1) bromsulfalein test for hepatic function (Rosenthal and White method - one specimen taken at the end of one hour); (2) prothrombin time (Quick's method); (3) serum bilirubin (modification of Thannhauser and Anderson method); (4) van den Bergh reaction; (5) erythrocyte, leukocyte and differential counts, hemoglobin estimation and a special blood smear for macrocytosis; (6) thick blood smear for malaria parasites.

During the ten-day period the patients were questioned and examined carefully concerning any untoward reactions or symptoms, and the skin and urine were examined carefully for the presence of the discoloration that sometimes results from administration of atabrine.

Forty-eight of the fifty patients had normal hepatic function as measured by the bromsulfalein dye-retention test. Prior to administration of atabrine, one of the remaining two patients was found to have bromsulfalein dye retention of from 6 to 12 per cent. At the end of the ten-day period of administration of atabrine, the hepatic function of this patient was normal. The second subject had normal hepatic function before administration of atabrine; he had bromsulfalein dye retention of from 6 to 12 per cent after the ten days of administration of atabrine. In only seven of the fifty cases was it possible to obtain an additional test of hepatic function thirty days after completion of the study and the hepatic function was normal in all of these. The prothrombin time, serum bilirubin, hemoglobin estimation, erythrocyte count, leukocyte count, differential count and special smears for macrocytosis were all found to be within normal limits, in all cases, before and after administration of atabrine.

The van den Bergh reaction varied considerably both before and after administration of atabrine. A direct van den Bergh reaction is nearly always indicative of hepatic damage. In this series of fifty cases, all patients had had malaria with multiple relapses and thirteen had had previous clinical jaundice. Therefore, it was not surprising to find that thirty-four of the fifty patients had a direct van den Bergh reaction before administration of atabrine. The group of eight cases in which the reaction was changed from indirect to direct was the only group in which there could be any suspicion of interference with hepatic function during the administration of atabrine. The fact that in nearly an equal number of cases the direct reactions changed to indirect during administration of atabrine makes one hesitate in drawing any conclusions concerning the minor interference with hepatic function which this single laboratory procedure might suggest.

In most cases, staining of the urine as the result of administration of atabrine was first noted on the second day. In a few cases, this staining was not noted until the fifth day. No other significant urinary findings were observed during the administration of atabrine.

Staining of the skin was clinically demonstrable in only eighteen of these fifty cases. The earliest staining was noted on the fourth day after institution of atabrine therapy, and the latest period for the development of staining was on the eleventh day. The average time of appearance of the stain was on the eleventh day. The discoloration of the skin usually disappeared in from two to three weeks after administration of atabrine had been discontinued. In the remaining thirty-two cases no visible staining of the skin was noted during the ten-day period of administration of the drug nor during the subsequent seven days of observation.

Minor complaints occurring infrequently included mild anorexia, nausea, diarrhea, fatigue, restlessness, pain in the epigastrium and left upper quadrant of the abdomen and precordial pains. These symptoms were of an extremely minor nature, and it is very doubtful that they were the result of administration of atabrine.

During the course of this study, the schedule of high dosage of atabrine also was employed in treating many patients with acute relapses of malaria who were not included in this series. It was observed that patients on this dosage of atabrine responded clinically just as well as did those who were given quinine. Usually within forty-eight hours after administration of atabrine the elevated temperature had returned to normal, chills had ceased, and the patient felt much improved. It was the impression of these investigators that patients who were given large doses of atabrine had fewer recurrences of malaria than did those given quinine. A good follow-up study on this problem, however, was impossible. It was also their impression that better

clinical responses to administration of atabrine might be obtained if larger doses than those used in this study were employed.

Many investigators believe that there is some accompanying hepatic damage in all initial and recurrent attacks of malaria. Theoretically, all of these fifty subjects had had repeated episodes of hepatic injury; thirteen of the fifty were known to have had previous clinical jaundice. This group, therefore, would appear to be fairly vulnerable to any hepatoxic action that atabrine might possess. Yet, with the limited laboratory procedures carried out, there was little evidence that atabrine, in the doses employed, exerted much, if any, hepatoxic action in humans. It is realized that more sensitive tests of hepatic function might have uncovered minor degrees of damage to the liver which were not revealed by the procedures employed, but such minor changes of hepatic function are extremely difficult to interpret. (Nav. Hosp., Corona, Calif. - Butt et al)

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DDT Impregnation of Underwear for Control of Body Lice: The impregnation of underwear with DDT has been investigated as a means of controlling the lice which affect man. Cotton garments and garments containing 50 per cent wool were treated with various concentrations of DDT in solution and in emulsion, and lice were introduced at various intervals after the treatment. Some garments were worn without laundering; others were washed periodically.

In arm-and-leg tests, garments treated with 0.05 per cent DDT in solution remained effective for more than a week's wearing. Garments impregnated with 0.5 per cent DDT solution were completely effective after three weekly washings, and those treated with a 1.0 per cent solution were completely effective after four washings. In general, about the same degree of effectiveness may be expected from treatment with solutions and emulsions of DDT. Arm and leg garments treated with DDT solutions showed no decrease in effectiveness after being stored for a year.

Two-piece suits of 50 per cent wool underwear receiving a dosage of 10 Gm. of DDT remained highly effective after five washings, and suits receiving 20 Gm. of DDT were effective after nine or ten washings. On this basis, a dosage of 15 Gm., equivalent to 2 per cent of the weight of the garment, is recommended to give protection against lice through from six to eight washings.

Practical methods for impregnation of underwear with DDT have been developed. A portable outfit making use of a 30-gallon Army water-sterilizing bag was found to be satisfactory. One filling of the bag was sufficient to impregnate 124 suits, or 186 pounds, of part-wool underwear. A large-scale

treatment was carried out in standard laundry equipment. Over 5,000 suits were treated with emulsion to give a dosage of 2 per cent of the weight of the garment. After this treatment, suits gave protection through from six to eight washings. After 6 months' wearing, an unwashed suit was still killing all lice which were introduced into it.

It is suggested that if underwear is to be impregnated with DDT in this country, volatile solvent solutions be used in dry-cleaning equipment. For louse proofing underwear overseas, an emulsion is recommended. The impregnation could be carried out in mobile laundry units, in the portable unit described above, or by the individual in any suitable, small container. (J. Economic Entomol., April '45 - Jones et al)

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Since DDT may be absorbed through the skin, precautions should be observed in handling or using oily solutions - Ed.

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Treatment of Subacute Bacterial Endocarditis Caused by Gamma Streptocci: Cases of subacute bacterial endocarditis caused by nonhemolytic streptococci have been treated with penicillin by Anderson and Keefer. From their experiences they have reached the following conclusions:

The infecting organism must be susceptible to penicillin if a favorable response to treatment is to be expected. A daily dosage of 200,000 units has been found to be effective. However, daily doses of 300,000 units provide a greater margin of safety. Only rarely are larger doses necessary. The duration of treatment should be at least 2 weeks, preferably 3 weeks. Occasionally, more prolonged treatment is necessary. Intermittent intramuscular injection at 2- or 3-hour intervals is the most convenient and satisfactory method of administration.

In 50 per cent of the cases, the infection responds promptly and apparently permanently to one course of treatment. In the other 50 per cent, various complications may be expected. These include death from conditions not responsive to chemotherapy, failure to respond to the usual doses of penicillin, or the reappearance of symptoms and bacteremia either immediately after the completion of treatment or at a later date. If the blood culture remains sterile after the completion of treatment, the persistence of fever, splenomegaly, leukocytosis, embolic phenomena, and an elevated sedimentation rate does not necessarily mean that therapy has been unsuccessful.

The formulation of precise criteria for determining when a patient is cured of his infection cannot be made until more experience is available.

At present, it appears advisable to wait until a patient has had negative blood cultures and has been free of symptoms for at least a year before considering him cured. Reinfection may occur at any time after the original infection has been eradicated. It is not unlikely that multiple attacks of subacute bacterial endocarditis may be observed in the future. (Evans Memorial Hospital, Boston, Mass., CMR Bulletin #48)

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Absorption, Distribution and Excretion of Streptomycin: The blood level of streptomycin, following a single intravenous injection, is better maintained than in the case of penicillin. Detectable amounts of streptomycin were usually present in the blood for six hours as compared with a period of from two and one-half to three hours during which penicillin may be detected, even when the latter is injected intramuscularly. The principal route of excretion for streptomycin, after parenteral injection, appears to be the urinary tract.

Following parenteral injection, streptomycin is distributed throughout most body fluids, including blood, urine, ascitic fluid, pleural fluid, aqueous humor, vitreous humor, amniotic fluid and bile. Only small amounts of the drug appear in the cerebrospinal fluid of healthy individuals, but in a single case of meningitis due to H. influenzae the spinal fluid contained 25 units per cc.

Relatively little transfer of streptomycin occurs between the blood and the lumen of the gastrointestinal tract in either direction. Following oral administration, levels as high as 9,000 units per Gm. were found in the feces. Owing to the poor transfer of the drug across the wall of the alimentary tract, it would seem appropriate to use the drug both orally and parenterally in the treatment of infections in which the pathogenic organisms are found both in the gastrointestinal tract and in the blood stream.

Early side reactions have not been alarming, and no late toxic effects have been observed. (OEMcmr-56, Flippin et al, Univ. of Pa., CMR Bulletin #45)

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Penicillin in the Treatment of Yaws: During the past year the Medical Department of the Navy has been conducting a study of the efficacy of penicillin in the treatment of yaws among the natives of Samoa. Reports concerning this project appeared in the Bumed News Letters of December 8, 1944, and March 16, 1945.

Of the cases treated to date, 60 were of early yaws, 30 of late yaws, and 19 were unclassified. Cases classified as early received 20,000 units of penicillin intramuscularly every 3 hours for 8 days, and the late cases received

the same dosage for 21 days. The total doses were therefore, 1,280,000 units and 3,600,000 units respectively. The unclassified cases were treated during a preliminary phase of the investigation and received total doses ranging from 200,000 to 3,200,000 units.

The early cases with generalized, fresh, granulomatous lesions were cured clinically more rapidly than were the later cases with destructive types of lesions. Patients with generalized, fungating yaws whose lesions were teeming with spirochetes were cured clinically in from 5 to 7 days. The late lesions, some of which had been present for long periods of time, healed at about the same rate as would any clean surgical wound. Pinch skin grafts, which took readily, were applied to some of the more extensive ulcers in order to shorten the time of convalescence. Roentgenographic studies in one case of yaws involving bone showed that the destructive process had been checked by penicillin and that there was an excess of dense osseous tissue at the site of the old lesion.

Darkfield studies demonstrated that the spirochetes disappeared from the early lesions within an average of 14 hours and from the late lesions in 13 hours. Darkfield examinations were negative in 3 late cases of long standing which had been treated with neoarsphenamine and bismuth without clinical improvement. These cases healed under penicillin therapy.

Four of the unclassified cases, treated during preliminary studies, are of unusual interest. Two of these patients were apparently cured with total doses of only 200,000 units administered intramuscularly in doses of 5,000 units at intervals of 3 hours. In one of these the Kahn test was essentially negative one year following treatment. A third case showed the usual prompt bacteriological and clinical response to penicillin administered over a period of 5 days (total dose 400,000 units). The Kahn test which had been strongly positive was nearly negative after six months. One year later, the patient developed a typical, raised granuloma of early yaws in which spirochetes were found. The Kahn test again became strongly positive. It was concluded that this child had again acquired yaws after having been cured of the original infection. A fourth patient in the unclassified group was the only therapeutic failure in the entire series of 109 cases. Although the darkfield examination was negative after 24 hours and the lesion healed, the Kahn test remained strongly positive. Four months later there was a recurrence of a foul, punched-out ulcers over the upper extremities and back, but these lesions showed no treponemata on darkfield examination. The reason for the failure of penicillin and for the persistence of unusually destructive and extensive lesions in this case is not clear. (The etiology of these lesions was not completely established. - Ed.)

Quantitative Kahn tests performed at intervals of 3 weeks showed, in general, a very slow reduction in titer and considerable fluctuation. The only

exception was in the single therapeutic failure previously described. The shortest time required for the Kahn test to become negative in this series was 5 months. In view of the similarity of Treponema pallidum and T. pertenue, the marked difference in rate of serological response is puzzling. Quantitative testing of sera from these patients will be continued at appropriate intervals.

In summary, it may be stated that, during a relatively short period of observation, penicillin has proved highly effective in the treatment of yaws. Clinical response has been prompt, while serological response has been very slow and irregular. Final evaluation cannot be made until these patients have been followed over a longer period of time.

The method of administering penicillin used in this study required hospitalization. If it were adequate to give one daily dose of the drug by employing absorption-delaying methods, or if oral administration should prove effective, it might be possible to treat natives with penicillin on an out-patient basis. Mass treatment of natives in the past has been largely an administrative problem which required weekly injections of arsenical or bismuth compounds and careful follow-up observations with treatment at definite intervals for a period of years. Whether or not mass therapy with penicillin can be made practical remains to be seen. (Research Proj. X-378, Third Report - J. K. Gordon)

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The Relationship of Effort to Acute Myocardial Infarction: The relationship between effort and myocardial infarction has been the subject of considerable discussion because of the important clinical and other practical implications. Blumgart has reviewed the histories of eleven patients with acute myocardial infarction consequent to strenuous effort. He points out that in military experience the occurrence of myocardial infarction during or soon after strenuous effort is striking.

The clinical criteria which must be satisfied to demonstrate this relationship are (a) the development and increase of cardiac symptoms, such as pain or substernal distress during or immediately following unusual effort, (b) the continuation of the symptoms after cessation of effort, (c) the presence of clinical signs and symptoms of acute myocardial infarction and (d) the development of characteristic electrocardiographic patterns of acute anterior, posterior or lateral wall myocardial infarction.

The pathologic mechanisms which induce acute myocardial infarction during or soon after effort are (a) subintimal hemorrhage or the rupture of an atheromatous abscess and (b) the occurrence of relative ischemia brought about by strenuous effort and resulting in a need for increased blood flow which the arteriosclerotic vessels are unable to meet. (J.A.M.A., July 14, '45)

Nitrogen Loss in Exudates in Surgical Conditions: Co Tui et al have studied the loss of body proteins as nitrogen in exudates resulting from various surgical conditions including: (1) surface burns; (2) avulsion; (3) seepage from areas of extensive surgical dissection, both infected and uninfected; and (4) local infections, such as abscesses of the lung and liver.

The loss of protein per unit area as revealed by polarimetry in cases of burns was significant. The largest amount lost was 3.28 mg. of nitrogen per square cm. of surface. At this rate, an average person with a surface area of 1.8 square meters, whose burns involved 50 per cent of the body surface, could lose 185 Gm. of protein in 24 hours. This amount would almost entirely deplete the blood of its osmotic component. In cases of extensive surgical dissection, the losses amounted to almost 5.9 Gm. of protein in 24 hours, equivalent to 644 c.c. of plasma. In these cases, the protein loss fell off rather rapidly during subsequent days. The nitrogen loss in a case of lung abscess and pyothorax amounted to at least 9.57 Gm. per day, representing almost all the nitrogen intake in a basic diet, and half of the intake in a high protein diet. It is evident why such patients are so often emaciated, and why the mortality rate is so high.

The adequacy of present hospital diets to support nutrition in cases of large protein drain is open to question. The basic diet, recommended by the National Research Council on the basis of Sherman's survey in 1920, contains 70 Gm. per kilogram of body weight, or 11.2 Gm. of nitrogen. Recommended as a maintenance diet, it has been adopted generally as a basic hospital diet. Since this diet is supposed to provide a margin of safety of from 50 to 100 per cent, it may be assumed that the minimum nitrogen requirement has been placed by Sherman as being from 5 to 7.5 Gm. per person, giving a margin of safety of from 3.7 to 5.6 Gm. The nitrogen loss at some stage of the convalescence in most of the cases in this study was larger than this margin. For this reason, it appears that the diet is inadequate for patients who are losing much protein. This inadequacy becomes evident when one remembers that this gram-for-gram matching has left out of consideration the fact that loss of urinary nitrogen is markedly increased in a large number of such conditions, and that it takes more than one gram of ingested nitrogen to cover one gram of nitrogen lost from the body. These workers feel that the protein content of the basic diet should be increased to provide for the replacement of increased nitrogen loss in disease, and they suggest that a 50 per cent increase would not be too much. The high protein diet consists of from 120 to 130 Gm. of protein (19 to 21 Gm. of nitrogen) and should be adequate to replace moderate amounts of protein drain, provided that pain, anorexia and other factors do not reduce the intake. In patients with extra metabolic protein drains of above 5 Gm. per day, even this higher protein diet may not be adequate. In many cases of large protein loss, it has been evident that the patient's recovery would be retarded or even jeopardized without the use of special measures of alimentation now

available, including the use of amino-acid mixtures (Amigen) orally or parenterally. (Ann. Surg., Feb. '45)

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Gastric Dilatation in War Injuries: Recent observations in a field hospital have indicated that marked dilatation of the stomach may occur in severely wounded men, regardless of the site of their wounds. Preoperative emptying of the stomach has long been a routine measure in cases with abdominal involvement, but there is good evidence that it is equally important in the presence of severe wounds in any location. It is believed that, with few exceptions, the procedure should be an integral part of the preoperative resuscitation program.

The mechanism of gastric dilatation is poorly understood. Best and Taylor state that the process involves a loss of gastric muscle tone and may be reflex in origin. Regardless of the initiating factors, the result is an accumulation of gas and fluid, often with a marked preponderance of one or the other. Following severe wounds, the dilatation may be extreme without producing nausea or vomiting. The presence or absence of food within the stomach apparently has little influence on the extent of the process; the stomach may assume surprising dimensions within a few hours after the man had been wounded. The extent of dilatation varies with the individual, and extreme degrees are probably unusual. Nevertheless, one should proceed with the assumption that any severely wounded individual may have a dilated stomach.

Resuscitation of patients in shock may be definitely hampered by a dilated stomach, particularly if there is concomitant chest pathology or if the abdominal muscles are rigid. In such cases the diaphragm is forced upward, with consequent displacement of the mediastinum, reduction in vital capacity and predisposition to atelectasis. It is known that these sequelae of acute gastric dilatation may, in themselves, produce profound prostration and even death. The correction of such distortions should be considered a part of resuscitation rather than as a mere pre-anesthetic measure, and decompression should be performed in the initial phase of treatment for shock.

The importance of gastric decompression in war casualties prior to anesthesia cannot be overemphasized. The aspiration of vomitus during the induction, maintenance, and recovery phases of anesthesia represents the greatest single hazard confronting the anesthetist. Vomiting cannot occur if the stomach is empty. In the occasional instance of marked gastric dilatation, the volume of fluid contents may be so copious that, should vomiting occur during anesthesia, asphyxiation is almost inevitable. The stomach tube should be left in place and its patency maintained throughout the period of anesthesia. Vomiting during the recovery phase is largely eliminated by this precaution.

There are only a few conditions in which the attempted introduction of a tube is likely to have an adverse effect; these include cases of mediastinal or deep cervical bleeding, patients having marked subcutaneous emphysema secondary to tracheal or pulmonary lacerations, and instances of probable esophageal involvement. Extreme caution should be used under such circumstances to avoid further damage. Wounds of the stomach, traumatic eviscerations, and wounds of the head do not constitute contraindication to the use of the tube. Indeed, in regard to head injuries, fatalities might be avoided if the gastric tube were to be inserted at the most advanced station and left in place during transportation to the neurosurgeon.

In regard to the technic of gastric decompression, the naso-esophageal Levin tube is usually adequate. If any difficulty is encountered because of the presence of undigested food, a colon tube may be used in lieu of the more satisfactory stomach pump. (M. Bull. Mediterranean Theater of Operations, June '45 - Beech and Wolff)

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Determination of Active Chlorine in Drinking Water: Chlorine and compounds containing active chlorine irreversibly inactivate enzymes whose activity depends upon the integrity of certain groups which are sensitive to oxidation. These groups are generally regarded to be SH groups. It has been shown that the bactericidal action of chlorine-containing compounds is due primarily to the irreversible destruction of triosephosphoric dehydrogenase which is essential for the oxidation of glucose and hence the growth of the microorganism.

These observations on the mode of action of chlorine have an interesting application to the practical problem of determining the concentration of active chlorine in drinking water. The usual chemical methods fail to differentiate between active chlorine (as Cl_2 or HOCl) and bound chlorine (as chloroamines). Fair suggested the possibility of using enzymes as agents for measuring the concentration of active chlorine in drinking water. The sensitivity of the triosephosphoric enzyme to chlorine in very low concentrations at once suggests the use of this enzyme. However, the enzyme and the catalytic system in which it works are not readily prepared and the method of testing would be far beyond the capacity of the average plant for sterilizing drinking water.

Green has investigated the possibility of using the proteolytic enzyme, papain. Apart from the fact that it is readily available, the method of testing for its activity is extremely simple. Milk incubated with papain undergoes clotting, and the clotting time becomes a measure of the concentration of papain. In order to determine amounts of chlorine of the concentration found in drinking water, the enzyme must be obtained in highly purified form so that the chlorine is not dissipated in reacting to form chloroamines with protein impurities.

A preparation of papain has been obtained which sustains a 25 per cent inhibition of its action in the presence of 2 p.p.m. of chlorine and 50 per cent inhibition in the presence of 10 p.p.m. However, the maximum of sensitivity has not yet been reached. (OEMcmr-443, Green, Columbia Univ., CMR Bulletin #48)

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Comparison of Continuous and Intermittent Exposure to Tropical Heat: Healthy volunteers, all 18 years old, were divided into two groups of six men each. During a control period of eight days the men became familiar with the physiological, psychological and physical examination procedures. The first group was then subjected to an environment of 90° F. dry bulb and 83° F. wet bulb for 21 hours a day, with three hours each day in a "treadmill room" at 108° F. dry bulb and 83° F. wet bulb. The second group followed the same procedure except for the fact that each night they were removed to a "cool room" (80° F. dry bulb, 70° wet bulb) for 12 hours. These tests were carried on for 30 days, and were followed by observations during a recovery period of six days. The subjects were motivated by the promise of a 20-day leave.

The hot group exhibited extensive heat rash which first appeared on some individuals within three days of exposure to the heat and continued throughout the 30-day period, whereas the cool group experienced nearly complete freedom from heat rash. The mean basal rectal temperature of the hot group was approximately 1° F. higher than that of the cool group. The mean basal pulse rate of the continuously exposed men was about four beats higher than that of the cool group. Their water loss during the night was approximately double that of the cool group. On the basis of reports of the subjects and the impressions of the observers, the cool group showed greater ease in going to sleep, more spontaneous activity, and greater alertness. None of the differences was progressive.

It is concluded that 18-year-old men can tolerate the temperature conditions used in this experiment, but that they do so at a physiological cost which might lead to deterioration of performance with longer exposures. The fact that heat rash did not occur in the intermittently cool group is considered of great practical significance. (Nav. Med. Res. Inst., Bethesda, Md. - Pace et al, CMR Bulletin #48)

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Shovelers' Fracture: Cases of fracture of the spinous processes of the 6th or 7th cervical or of the dorsal vertebrae as a result of muscular pull incident to prolonged shoveling have been described recently by Annan. The line

of fracture, running at right angles to the long axis of the process, was demonstrated roentgenographically. In most cases there was separation of the fragments with downward displacement of the detached fragment. The injury occurred usually in robust men who had been accustomed to hard manual labor prior to their military life and after at least six weeks of shoveling at which time one might expect that they would have been adjusted to the stresses and strains of this work.

The ligamentum nuchae is attached to these spinous processes and continues toward the occiput with a fibrous sheet connecting it to the spines of the other cervical vertebrae. When one is in a stooping position, this ligament is taut, and because of its continuation caudally with the ligament connecting the spines of the dorsal vertebrae, it exerts a compressing force on the prominent spinous processes. A second factor is the muscular attachments to the spines and ligament. In fixing the scapulae before taking weight on the left arm, the left serratus magnus and the rhomboideus minor, the trapezius and splenius capitis of both sides, as well as the left rhomboideus major, are made to contract. When there is an imbalance in the contralateral components, the strain of the lift suddenly transferred to the left arm and shoulder girdle will reach the spine and exert a shearing action inferolaterally directed on the most prominent part of the muscular origin, the vertebral spinous processes and the ligament in that area.

It is possible that many such fractures are being overlooked. When the possibility of this type of fracture is considered, the diagnosis may be established by roentgenographic examination. By means of proper diagnosis and early institution of therapy, later operative intervention to remove the bone fragment may be avoided. Treatment consists of local heat and rest, with progression to graduated exercises. Ultimate healing is by fibrous union. (Lancet, Feb. 10, '45)

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A Toxic Principle in Influenza Virus: Further evidence of the toxicity of influenza virus has been obtained by intraperitoneal injection of infectious allontoic fluids into mice. The animals succumbed as a result of such injections within from 16 to 72 hours. The main findings at autopsy were hemorrhages into the small intestines and occasionally into the stomach. The liver showed a distinct, fine mottling, and on histological examination extensive necrosis of the parenchyma was noted. In the spleen, necrosis of the Malpighian bodies was apparent. In animals which survived longest, ascites and pleural exudate were not uncommon. Lung lesions developed only when certain influenza strains were employed. Surviving mice, in some instances, developed jaundice as shown by positive tests for bilirubin in the urine. When sacrificed, the subcutaneous tissue of these animals was bright yellow. The liver showed diffuse and focal

proliferation of lymphoid and reticulo-endothelial elements. Multiple areas of focal necrosis, with practically no peripheral reactions, were present in these cases.

Bacteriological examination of peritoneal fluid, liver and blood from the heart as well as a search for pathogens in the intestinal flora, did not yield any significant results. Two strains of mice from different breeders gave the same reactions. The injected virus disappeared from the peritoneal cavity and liver within from two to four days.

The highest incidence of toxic deaths was noted with swine virus (S-15) and with two strains of influenza A virus which had been isolated from fatal human cases. Death occurred less frequently following injection of PR-8, WS and Lee virus, while the Weiss strain has not caused these toxic manifestations as yet. The toxic activity did not closely parallel infectivity or hemagglutinating capacity. Preparations of virus of equally high infectivity for eggs, or with the same agglutinating titer, varied in results from no toxic death to 100 per cent fatality in 24 hours. It appears that the property is transitory, becoming more marked after the infectivity has reached its peak and decreasing while the infectivity is still high.

The toxic principle is not dialyzable; it is thrown down in the sediment by the high speed centrifuge with the infective agent; it is adsorbed by chick red cells and may be eluted therefrom; it is neutralized by human convalescent serum but not by pre-infection serum; mice immune to influenza A respond to intraperitoneal injection of B but not of A virus, and conversely.

Only active influenza virus has given these results. Inactivation by ultraviolet light, heating at 56° C. or exposure to formalin (1:2000) rendered the preparations innocuous. (OEMcmr-360, Henle, Children's Hosp. of Phila., CMR Bulletin #45)

* * * * * *

Effect of Lipids on Toxicity and Antigenicity of The Toxin of Clostridium Perfringens: Further evidence has been obtained that phosphatides injected into dogs before or during the administration of the toxin of Cl. perfringens act chemically to inhibit the damaging effects of the toxin. This protective effect has been found in the "lecithin" (acetone insoluble, alcohol soluble) fraction of cell lipids, while the cephalin and cholesterol-fat fractions have no protective effect.

When a 10 per cent emulsion of lecithin was mixed with toxin in a test tube for a few minutes at room temperature and the mixture (containing 4.2 MLD of toxin and 75 mg. of lecithin) was administered in 3 closely spaced intravenous injections, 5 out of 5 mice survived, whereas 3 out of 3 controls

receiving the toxin alone died. Of a group of 19 mice which received lipids and survived a lethal dosage of Cl. perfringens toxin, 10 mice survived the administration of a second lethal dose (4.2 MLD) 10 days later. Two dogs which had received lipids intravenously and had survived following a dose of toxin of 220 LD_{50} per kilogram of body weight were tested 2 weeks later and found to have a good serum antitoxin titer against Cl. perfringens.

This evidence suggests that lecithin decreases the toxicity of the Cl. perfringens toxin without destroying its antigenic properties.

A preparation of the total purified lipids of human plasma was found to protect 10 out of 14 mice from a lethal intravenous dose of Cl. perfringens toxin (4.2 MLD), to which 8 out of 8 control mice succumbed. The dosage of plasma lipid used ranged from 2 to 15 mg. and was given intravenously prior to administration of the toxin. (OEMcmr-135, Aub et al, Mass. Gen. Hosp., CMR Bulletin #48)

* * * * * *

Effect of Environment on Dermal and Urinary Excretion of Iodine: A comparative study was made of the effects of a comfortable environment and of a hot-moist environment on the dermal and urinary excretion of iodine by adult human subjects. The concentration of iodine in undiluted sweat obtained under hot-moist conditions was 0.95 gamma per 100 c.c. A single dose of 2 mg. KI increased the average concentration to 3.1 gamma per 100 c.c., while 14 daily doses of 2 mg. KI did not produce any significant additional increase.

Profuse sweating increases dermal losses of iodine at high levels of iodine intake (KI dosage), but no consistent effect was observed at low levels. No evidence was obtained that an environment which induces profuse sweating will increase iodine requirements.

At least three-fourths of the total iodine lost from the body was excreted through the urine. When the iodine intake was increased by KI supplementation, most of the increased excretion of iodine occurred in the urine. (OEMcmr-227, Spector et al, Univ. of Illinois, CMR Bulletin #48)

* * * * * *

Anti-Rh Serum: Anti-Rh serum is now available at the Naval Medical School. It is requested that all naval medical establishments forward their requisitions for this material to the Naval Medical School, National Naval Medical Center, Bethesda 14, Maryland, as the serum is available only from this activity. Anti-Rh serum will be provided as a liquid in 2 c.c. bottles. It should be kept under ordinary refrigeration since the anti-Rh activity deteriorates

eventually at room temperature. Accordingly, requests for small amounts of serum at reasonable intervals are to be preferred to infrequent requests for large amounts.

* * * * * *

Public Health Foreign Reports:

Disease	Place	Date	Number of Cases
Cholera	China, Szechwan Province	June 5-25, '45	8,240 (241 fatal)
		July 16, '45	26 (8 fatal) (spreading)
Plague	Argentina	May '45	1 (fatal)
	Egypt	June 2-9, '45	16 (2 fatal)
		June 9-16, '45	12
		June 23-30, '45	12 (4 fatal)
	France, Corsica, Ajaccio	July 7-14, '45	2 (1 fatal)
	Great Britain, Malta	July 9, '45	8 (4 confirmed)
	Morocco (French)	June 21-30, '45	77
	Peru	May '45	4
Smallpox	Belgian Congo	June 16-23, '45	599 (4 fatal)
	Boliva, Beni Dept., Magdalena	July 14, '45	200
	Morocco (French)	June 21-30, '45	75
	Union of So. Africa	April '45	241 (20 fatal)
	Uruguay, Rocha Department	June 23-30, '45	19
Typhus Fever	Algeria	June 1-10, '45	51
	Boliva	May '45	61 (17 fatal)
	Cameroon (French)	June 21-30, '45	5
	Chile	April 22-May 19, '45	59 (4 fatal)
	Egypt	June 2-16, '45	882 (113 fatal)
	France	June 2-27, '45	127
	Iran	March 10-17, '45	29
	Morocco (French)	June 21-30, '45	415
	Turkey	July 7-14, '45	42
	Union of So. Africa	March '45	106 (10 fatal)
		April '45	131 (9 fatal)

Public Health Reports (Cont.):

Disease	Place	Date	Number of Cases
Yellow Fever	Brazil	April 16-May 23, '45	9
	Gold Coast, Nsawam	June 29, '45	1 (suspected)
		July 14, '45	1 (suspected)
	Ivory Coast, Grand Bassam	July 14, '45	1 (suspected)
	Peru, Loreto Dept., San Martin Province	April '45	1
	Venezuela	June 17-20, '45	12 (3 fatal)

(Pub. Health Reps., Aug. 3 & 10, '45)

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CIRCULAR LETTER NO. 232-45

To: All Ships and Stations.

Pers-20A-ED
ET14/P16-1
11 August 1945

Subj: Records Coast Guard Patients Transferred to Naval Hospitals.

Ref.: (a) BuMed ltr. BuMed-C-LET, ET14/A3-1(081-40), of 17 Feb 1944; AS&SL Jan.-June 1944, 44-222, p. 355.
(b) BuPers Circ. Ltr. 115-44; AS&SL Jan.-June 1944, 44-496, p. 544.

1. Paragraph 1 (d) of reference (a) and paragraph 7 (d) of reference (b) are modified to read as follows:

"(d) When Coast Guard personnel are transferred to naval hospitals either within or outside the continental limits of the United States, their pay accounts and records shall accompany them or be transmitted as soon as practicable."

2. The above instructions have been approved by the Coast Guard, Bureau of Medicine and Surgery, and Bureau of Supplies and Accounts.

--BuPers. W. M. Fechteler.

* * * * * *

To: All Ships and Stations.

Op13-1D-psp
Serial 406713
7 20 8
31 July 1945

Subj: Office of Inspector of Medical Department Activities, Central Area - Extension of Area Covered by

Ref.: (a) SecNav ltr. Op13C-jc, serial 154713, of 10 Aug. 1943; N. D. Bul. Cum. Ed. 1943, 43-1296, p. 19.

1. Reference (a) which established the Office of Inspector of Medical Department Activities, Central United States, Room 1184, Board of Trade Building, Chicago, Illinois, is hereby modified so that the area covered by such office will include the Seventh Naval District as well as the Eighth and Ninth Naval Districts.

2. Bureaus and offices concerned take necessary action.

--SecNav. A. L. Gates.

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To: All Ships and Stations.

Op13-1D-psp
Serial 407213
7 4 60
2 August 1945

Subj: U. S. Naval School of Hospital Administration, National Naval Medical Center, Bethesda, Maryland - Establishment of

1. To meet the demand for specially qualified Hospital Corps Officers, the following activity is hereby established, under an officer in charge, and designated:

U. S. Naval School of Hospital Administration,
National Naval Medical Center,
Bethesda, Maryland. 7438 250

This is a separate command of the National Naval Medical Center, Bethesda, Maryland.

2. Bureaus and offices concerned take necessary action.

--SecNav. A. L. Gates.

* * * * * *

To: All Ships and Stations. BuMed-ECB-FAS (P & B)

Subj: Medical Department Forms and Publications, Identification of 2 August 1945

Ref.: (a) Ltr. BuMed-ECB-FAS, A3-3/EN10(064), of 14 Dec. 1944; N. D. Bul. of 15 Jan. 1945, 45-23.
(b) Ltr. BuMed-ECB, A3-3/EN10(064), of 27 Jan. 1945; N. D. Bul. of 31 Jan. 1945, 45-87.

Enc.: (A) List of Medical Department Forms and Publication (exclusive of those used for internal administrative purposes in BuMed).

1. Enclosure lists official forms and publications of the Medical Department in effect as of 30 June 1945.

2. References (a) and (b) are hereby canceled.

3. Items indicated by asterisk (*) are available only from BuMed, Washinton 25, D. C. Items indicated by double asterisk (**) are to be prepared locally. All other forms and publications are available from naval medical supply depots.

-- BuMed. W. J. C. Agnew

ENCLOSURE (A)

LIST OF MEDICAL DEPARTMENT FORMS AND PUBLICATIONS
(Exclusive of those used for internal administrative purposes in BuMed)

30 June 1945

NavMed Identification	Title
A	Report of Cases of Syphilis and Arsenical Treatment
B	Report of Allotment Expenditures and Obligations
D	Inventory or Transfer of Property, Med. Dept., U. S. N.
E	Statement of Receipts and Expenditures of Medical Department Property
F	Individual Statistical Report of Patient (File Copy)
Fa	Individual Statistical Report of Patient (Bu Card Copy)
G	Hospital Ticket
H-1	Health Record (Cover)
H-2	Health Record (Physical Examination)
H-3	Health Record (Immunization Record)
H-3a	Health Record (Special Duty Abstract)

NavMed Identification	Title
H-4	Health Record (Dental Record)
H-5	Health Record (Abstract of Service)
H-6	Health Record (Syphilitic Abstract)
H-7	Health Record (Abstract of Antiluetic Treatment)
H-8	Health Record (Medical History)
H-9	Health Record (Aviation Medical Abstract)
I	Weekly Report of Patients
K	Report of Dental Operations and Treatment
L	Report of Prosthetic Dental Treatment
M	Report of Board of Medical Survey
Ma	Report of Board of Medical Survey (Following Sheet)
N	Certificate of Death
P	Report of Surgical Operations
Q	Clinical Chart
R	Issue Voucher
S	Binnacle List
T	Morning Report of Sick
U	Report of Medical, Dental, and Hospital Treatment, etc.
V	Statement of Receipts and Expenditures of Medical Stores
W	Medical Stores Ledger Sheet
Wa	Land and Building Ledger Sheet
X	Recruiting Statistics
Xa	Recruiting File Record
Y	Report of Physical Examination
AV-1	Physical Examination for Flying
HC-3	Receipt, Transfer and Status Card
HC-4	Roster Report of the Hospital Corps
HC-4a	Roster Report of the Hospital Corps (Following Sheet)
HF-1	Admission of Discharge of Officer
HF-3	Transfer of Men
HF-4	Order to Transfer Accounts
HF-5	Order for Transfer of Men
HF-7	Order for Transportation
HF-9	Ward Report
HF-10	Daily Personnel Report
HF-11	Equipment Voucher
HF-17	Clinical Notes
HF-18	Diet Sheet
HF-20	Liberty List
HF-21	Laundry List
HF-22	Personal Effects Tag
HF-23	Order and Inspection Blank
HF-25	Baggage Record Card
HF-27	Laboratory Examination

NavMed Identification	Title
HF-32	Pass Book
HF-33	Letterheads (U. S. Naval Hospitals)
HF-35	Commissary Ledger (Cash Value Sheet)
HF-35a	Commissary Ledger (Extra Sheet)
HF-36	Ration Record
HF-37	Receipt and Expenditure Voucher (For Commissary Ledger)
HF-38	Burial Record
HF-39	Register of Patients
HF-40	Special Diet Order Sheet
HF-53	Notice of Change in Diagnosis
HF-57	Special Examination and Treatment Request
HF-58	Operation Record
HF-59	Clinical Record
HF-59a	Anatomical Chart for Clinical Record
HF-61	Information for Next of Kin
HF-62	Time and Pay Roll Record
HF-63	Request for Repairs
HF-64	Operations Scheduled
HF-66	Communications Routing Slip
HF-67	Allotment Record
4	Requisition and Invoice, Medical Supplies and Equipment
70	Patient's Identity Tag
102	Report of Neuropsychiatric Patients
103	Hospital Bed Capacity - Quarterly Report
*104	Weekly Morbidity Report (Publication)
110	First Aid for Battle Casualties
*111	Control of Malaria Vectors
*112	U. S. Naval Medical Bulletin
*113	Hospital Corps Quarterly
114	Outline of Medical Dept. Duties, U. S. N.
116	Supply Catalog, Medical Dept., U. S. N.
117	Manual of the Medical Department
*119	Edible Food Plants, Arctic Region, 1943
*120	Nurse Corps Application for Appointment
123	Electric Shock, First Aid Treatment
124	Medical Compend for Comdrs. of Naval Vessels
126	Manual of Naval Hygiene
*127	Edible and Poisonous Plants of Caribbean Region
130	Handbook of the Hospital Corps
*133	Epidemiology of the Diseases of Military Importance in the Netherland Indies, 1943
*134	Hospital Corpsman, U. S. N., 1943

NavMed Identification	Title
*136	Epidemiological Throat Culture Card
*138	Research Division Project Form
*141	Prevention of Malaria in Military and Naval Forces in the South Pacific
*142	Military Malaria Control in the Field
*143	Malaria Mosquitoes and Men
146	Label Direction, Box, Round
147	Label Direction, Poison (bottle and powder box)
148	Prescription Pads
*150	Catalog of Medical Teaching Films
*153	First Aid Treatment for Survivors of Disasters at Sea
*154	Statistics of Diseases and Injuries (Annual-state year desired)
171	Venereal Disease Contact Report
172	Weekly Morbidity Report (Form)
*178	Biographical Inventory
*179	Mechanical Comprehension Test (MCT Form 4)
*180	Mechanical Comprehension Test (MCT Form 5)
*181	Aviation Classification Test-ACT Form 1
*182	Aviation Classification Test-ACT Form 2
*193	Health Precautions for Personnel on Detached Duty
*199	Answer Sheet, ACT, MCT
*200	Answer Sheet, B. I.
*201	Mechanical Comprehension Key (MCT) Form 4
*202	Mechanical Comprehension Key (MCT) Form 5
*203	Aviation Classification Key (ACT) Form 1
*204	Aviation Classification Key (ACT) Form 2
*205	Biographical Inventory, Key X
*206	Biographical Inventory, Key Y
*207	Biographical Inventory, Key Z
210	Emergency Medical Tag
*211	Compilation on the Diseases of Naval Importance of Micronesia
*216	Index of References to Physical Examinations, Physical Requirements and Physical Standards for U. S. Navy, U. S. Naval Reserve, U. S. Marine Corps, and U. S. Marine Corps Reserve
*217	Medical Questionnaire for Applicants for the Nurse Corps of the U. S. Navy and U. S. Naval Reserve Corps
220	Manual on Treatment of Casualties from Chemical Warfare Agents (for the information and guidance of Medical Officers, USN)

NavMed Identification	Title
*241	Results of Aviation Cadet Selection Tests
*247	USN Aviation Cadet Selection Tests Examiner's Manual
255	Medical Stores Invoice (6 part set)
255a	Medical Stores Invoice (6 part set continuation)
*256	Naval Dental Officer Questionnaire
259	Medical Stores Invoice (9 part set)
259a	Medical Stores Invoice(9 part set continuation)
*266	Epidemiology of Diseases of Naval Importance in Formosa
*279	The N P Problem
*284	The Prevention of Bacterial Respiratory Tract Infection in the U. S. Navy by Sulfadiazine Prophylaxes
*292	Manual on D D T Insecticides
*296	Naval Aviation Night Vision Instructor's Manual
*299	Typical Breeding and Resting Places of Anopheles Punctulatus Moluccensis in the South Pacific
*323	Prophylactic Immunizations Required in the U. S. Navy
*331	Chart-"U. S. Naval Medical History"
*342	Aviation Psychology Technical Memorandum
350	Chapter 11-Physical Examinations for the Medical Dept.
351	Statistical Reporting and Diagnostic Nomenclature
*352	Chapter 19-Deaths and Resulting Duties
*353	Chapter 21-Medical and Dental Attendance
*354	Field Photographic Unit-Field Casualty Record
*355	Field Photographic Unit-Evacuation Photo Field Casualty
*356	Field Photographic Unit-Base and Station Report
357	Handbook of the Hospital Corps, Addendum
*358	Hospital Corpsman-Procurement Card
359	Emergency Medical Tag Poster
*360	Malaria Don'ts After Sundown
*361	The Mosquito is Little-But
*362	Casualty List-Japs 1, Malaria 3
*363	Enemies Both
*364	Man Made Malaria
*365	Is Your Organization Prepared
*367	Catalog of Hospital Corps Schools and Courses
368	Drill Book for the Hospital Corps, USN, 1942
*369	News Letter
*370	Aviation Supplement
371	Medical Services, Joint Overseas Operation (Restricted)
*372	Job Analysis, Hospital Corps USN, 1942
*373	Enlist in the WAVES-Serve in the Hospital Corps
375	Individual First Aid Packet, 1943 (poster)
376	To a Young Woman Entering the Navy, 1943

NavMed Identification	Title
*377	On Target
*378	The Story of Old Joe
*379	Ed Puts 'Em Wise
*380	Service to Tojo
*381	Protect Yourself
382	Lightning Can Strike You Twice
*383	Hull Down
*384	Venereal Disease, VP-1, 1943, "Fight Syphillis"
*385	Venereal Disease, VP-2,1943, "Easy to Get"
*386	Venereal Disease, VP-3, 1943, "Your Face Looks So Familiar"
*387	Venereal Disease, VP-4, 1943, "Them Days is Gone Forever" (Sailors)
*388	Venereal Disease, VP-5, 1943, "Them Days is Gone Forever" (Marines)
*389	Venereal Disease, VP-6, 1944, "It's Worth Repeating"
*390	Venereal Disease, VP-7, 1944, "Please Be Careful"
*391	Venereal Disease, VP-8, 1944, "Now-What Was I Supposed to Remember"
*392	Venereal Disease, VP-9, 1944, "Pro Station 30 Feet"
*393	Venereal Disease, VP-10, 1944, "Liberty Pass"
*394	Venereal Disease, VP-11, 1944, "Let There Be Light"
*397	Venereal Disease, VP-12, 1944, "There's No Place"
*398	Venereal Disease, VP-13, 1944, "I Should Have Gone to the Pro Station"
*399	Venereal Disease, VP-14, 1944, "Lightning Can Strike Twice"
416	Hospital Ticket-Women
*425	Facts About the Navy Nurse Corps
*426	Instructions to Applicants for Commission in the Nurse Corps and Reserve Nurse Corps, U.S.N. (Part 1-A)
*427	Instructions to Applicants for Commission in the Nurse Corps and Reserve Nurse Corps, U.S.N. (Part 1-B)
*428	Instructions to Applicants for Commission in the Nurse Corps and Reserve Nurse Corps, U.S.N. (Part 2)
*429	Information for Applicants for Commission in the Nurse Corps and Reserve Nurse Corps, U.S.N.
*439	Low Pressure Chamber Flight Log
*440	Altitude Training Unit Monthly Report
*451	List of Publications
*460	Supplement to the Epidemiology of Diseases of Naval Importance in Formosa
461	Quarterly Dental Report-Personnel, Equipment, Facilities

NavMed Identification	Title
*502	Diet Formulary
*518	Manual on Rat Control
*539	Supplement to Examiner's Medical Manual (Aviation)
*546	Directory of Officers of BuMed
556	Spectacle Order
562	Dependents Identification Card
566	Appointment Book, Medical Dept.
567	Register Number 1-Charge Register
568	Register Number 2-Expense Analysis Register
569	Register Number 3-Recapitulation of Ledger Accounts
570	Sheets, Rules (For General Ledger)
574	Medical Stores Requisition (Transferred)
*578	BuMed Gazette
*579	Hospital Corps Quarterly News Service
*580	A Synopsis of Philippine Mosquito
582	Monthly Morbidity Report
585	U. S. Navy Immunization Record
*588	Anti-Malarial Drug Investigation-Follow-up card
*589	Monthly Report of Night Vision Training
**590	Combined Report of Enlisted Hospital Corps
*598	"The Gun Crew", VP-15
601	Report of Burial
609	Report of Disposition and Expenditures-Remains of Dead
610	Monthly Prosthodontia Report
*615	Anatomic Location Code
**618	Report of Photofluorographic Chest Survey
620	Medical Supply News Letter
621	Penicillin Therapy Report-Early and Latent Syphilis
622	Spinal Fluid Test Report
623	Monthly Kahn Test Report
*630	Epidemiology of Diseases of Naval Importance in Coastal China with Special Attention to Coastal Prov.
*632	Notes on Water Supply Ashore
*638	Notes on Waste Disposal
*639	Addendum to Catalog of Hospital Corps Schools and Courses
*642	Manual on Asiatic Schistosomiasis
*653	Louse Control Manual
*654	Plotting the Course (Manual for Amputees)
656	Label Direction (Bottle and Powder Box)
*658	Procedural Manual-(FA Card)
*664	VD Can Be Cured (Poster)

NavMed Identification	Title
669	Monthly Summary, Med. Care of Dependents
675	Snail Fever
*716	Rehabilitation Program, Med. Dept., U.S. Navy
*719	Survey of Local Hospital Forms
723	Snail Fever is Dangerous (set of 4 posters)
732	Request for Work
*737	Night Vision Training Suggestions
*743	"When You Stuck Your Neck Out"
*745	"The Elephant is Thick Skinned"
*762	Essentials of Internship and Residency-Type of Training in Naval Hospitals
767	Inventory and Issue of Medical Supplies and Equipment
*771	Navy VD Contact Investigation Report (Quarterly)
*772	Tuberculosis Is No Respecter of Persons
*773	I've Always Had Time to Check for TB
*774	I've Always Found Time To Check for TB
*775	Training Program and Outline (Ships)
*776	Training Program and Outline (All Hands and Hospital Corps)
*777	Training Program and Outline (Sanitation, Service Forces)
*778	Training Program and Outline (Epidemic Disease Prevention)
780	Register of Laboratory Matériel Catalog
782	Ninety-Five Years of Service, U.S. Naval Medical Supply Depot, Brooklyn, N. Y.
785	Semiannual Dental Officer Personnel Report
*792	Report of Address

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To: All Ships and Stations. BuMed-M H3-mwb
P11-1/S37-2

Subj: Medical Repair Service and Dental Repair Service, Specialization Courses in 9 August 1945

Ref.: (a) Catalog of Hospital Corps Schools and Courses, revised 1944.
(b) Ltr. BuMed-MH3-DCB, P11-1/MM, of 20 Jan. 1945; N. D. Bul. of 31 Jan. 1945, 45-85.
(c) Ltr. BuMed-MH6-SEH:mf, P11- 1/MM(111-41), of 20 Jan. 1945; N. D. Bul. of 31 Jan. 1945, 45-84.

Enc.: (A) Curriculum for course in dental repair service.
(B) Curriculum for course in medical repair service.

1. Specialization courses for male enlisted personnel of the Hospital Corps to be known as "Dental Repair Service" and "Medical Repair Service" are hereby established and shall be made a part of reference (a). These courses shall be for the purpose of training personnel in the installation, maintenance, and repair of dental and medical equipment.

2. The instruction center for the course in dental repair service shall be the U. S. Naval Training Center, Bainbridge, Md., and for the course in medical repair service, the instruction center shall be the Naval Medical Supply Depot, Brooklyn, N. Y.

3. Enclosures (A) and (B) set forth the curricula and the content of each subject of the two courses.

4. The length of subject courses shall be 6 months, but shall be accelerated to 4 months for the duration of the war. This acceleration shall be accomplished by modifying proportionately the hours shown in enclosures (A) and (B).

5. The prerequisites required of personnel recommended for instruction in subject courses shall be as follows:

Minimum Qualifications	Desirable Qualifications
Dental Repair Service.	
Dental Technologist (General).	Dental Technologist (General).
Two years of high school.	High-school graduate (including a course in physics).
Electrical and mechanical ability.	Electrical and mechanical ability.
	Related experience.
Medical Repair Service	
High School graduate (including a course in physics).	X-ray technologist or X-ray and photofluorographic technologist.
Electrical and mechanical ability.	College or trade-school training (including a course in physics).
	Electrical and mechanical ability.
	Related experience (such as experience in radio repair either commercial or as a hobby).

6. Personnel for subject course shall be recommended for instruction in accordance with references (b) and (c) and will be placed under instruction in the manner indicated in reference (c).

7. Candidates satisfactorily completing the course to which assigned will be certified in the following manner:

Dental Repair Service-Qualified Dental Repairman.
Medical Repair Service-Qualified Medical Repairman.

--BuMed. W. J. C. Agnew

Enclosure (A)

CERTIFICATE IN DENTAL REPAIR SERVICE
(Qualified Dental Repairman)

Subjects	Clock Hours Didactic	Practical
RS 1 Physics, applied	30	30
RS 2 Principles of Dental Equipment	40	210
RS 3 Installation of Dental Equipment	25	60
RS 4 Maintenance and Repair of Dental Equipment	15	550
Total hours	110	850
Grand total	960	

RS 1 Physics, applied.
Physics with special emphasis on electricity and hydraulics.
RS 2 Principles of Dental Equipment.
Mechanical and electrical principles of dental equipment and fundamentals of operation.
RS 3 Installation of Dental Equipment.
Installation procedures including electrical and plumbing essentials.
RS 4 Maintenance and Repair of Dental Equipment.
Maintenance procedures, mechanical and electrical trouble finding, and equipment repair.

Text: 1. Handbook of the Hospital Corps, U. S. Navy
2. Dental Equipment Instruction Manuals of various manufacturers.
3. Manual of Medical Department, U. S. Navy
4. Supply Catalog, Medical Department, U. S. Navy.

DEPARTMENT OF REPAIR SERVICE

RS 1 Physics, applied (Course for Dental Repairmen)
Mathematics-shop arithmetic and such fundamentals of algebra as are applicable.
Hydraulics-principle of rotary and piston type hydraulic pumps.
Electricity-atomic structure; magnetism; static electricity; direct and alternating currents; blue print reading; alternating current machinery, motors, generators, and coils; condensers; series and parallel connections; convertors; rheostats; switches; cathode rays; x-ray tubes; testing equipment.
Safety precautions-electrical; radiation.

RS 2 Principles of Dental Equipment

Tools-description and manufacture of tools required.

Component parts of the chair, operating unit and accessories, operating light, x-ray, straight and contra-angle hand pieces, sterilizer, air compressor, compound heater, model trimmer, lathe, electric motors, amalgam dispensers, electric furnaces, articulator and casting machine; dental instruments.

Fundamentals of the operation of the levers, locks and hydraulic pump of the chair; the switches and electric regulators, valves, syringes, air cut-off, low voltage instruments, cuspidor, air regulator and air filter, dental engine and aspirator of the operating unit; the operating unit on A.C. and D.C. current; the circuit breaker, hand timer, and the stabilizer electrical controls of the x-ray unit; the operation of x-ray units on different voltages and on A.C. and D.C. currents; the sterilizer; the air compressor; the lathe.

Practical work with the component parts of dental equipment of the various manufacturers through disassembling and assembling, and in the operation of the equipment.

RS 3 Installation of Dental Equipment

Floor plans (including lay-outs and roughing-in) and blue print reading.

Proper location of chair, operating unit, x-ray, air compressor, sterilizer, instrument cabinet, laboratory and dark room equipment, in accordance with BuDocks standard plans.

Proper location, size and elevation of waste, water, air and gas lines; location of electric lines to the units of dental equipment.

Uncrating, assembling, securing and testing of chair, operating unit, x-ray unit, air compressor, sterilizer, instrument cabinet and all laboratory equipment.

Location and installation of amalgam dispensers, cup dispensers, soap dispensers and other miscellaneous items.

Variation in procedures for installations afloat, in accordance with BuShips standard plans.

Practical work in assembling, installing and testing of all dental equipment.

RS 4 Maintenance and Repair of Dental Equipment

Cleaning and oiling of component parts of the equipment.

Care of the finish of equipment.

Adjustments necessary for the proper functioning of dental equipment.

Repair and/or replacement of parts of all types of dental equipment.

Survey of equipment.

Disassembling and repacking of equipment.

Procurement of equipment-identification of spare parts; use of catalogs.

Practical work in adjusting, repairing and/or replacing of component parts of dental equipment.

Actual practice in all types of trouble finding.

Enclosure (B)

CERTIFICATE IN MEDICAL REPAIR SERVICE

(Qualified Medical Repairman)

Subjects	Clock Hours Didactic	Practical
RS 5 Physics, applied	100	20
RS 6 Principles of Medical Equipment	40	180
RS 7 Installation of Medical Equipment	20	120
RS 8 Maintenance and Repair of Medical Equipment	30	450
Total hours	190	770
Grand total	960	

RS 5 Physics, applied.
Physics with special emphasis on electricity and electronics.

RS 6 Principles of Medical Equipment.
Mechanical and electrical principles of medical equipment and fundamentals of operation.

RS 7 Installation of Medical Equipment.
Installation procedures including electrical and plumbing essentials.

RS 8 Maintenance and Repair of Medical Equipment.
Maintenance procedures, mechanical and electrical trouble finding, and equipment repair.

Text:
1. Handbook of the Hospital Corps, U.S. Navy
2. Medical Equipment Instruction Manuals of various manufacturers.
3. Manual of Medical Department, U.S. Navy
4. Supply Catalog, Medical Department, U.S. Navy

DEPARTMENT OF REPAIR SERVICE

RS 5 Physics, applied (Course for Medical Repairmen)
Mathematics-shop arithmetic and such fundamentals of algebra and trigonometry as are applicable.
Electricity-atomic theory; wave spectrum and quantum theory; magnetism; types of electrical currents; circuits; blueprint reading; condensers and coils; electronics.
Safety precautions-electrical; radiation; protective materials and devices.

RS 6 Principles of Medical Equipment
Component parts of electric motors, x-ray, photofluorograph, electrocardiograph, basal metabolism equipment, short-wave diathermy equipment, electroencephalograph, electro-surgical units, audiometers, anesthesia and oxygen therapy equipment, ultra-violet lamps, infra-red lamps hydrotherapy equipment, refrigeration units, hydraulic tables, operating lamps, sterilizers and related equipment.

Fundamentals of operation and use of the above medical equipment.
Practical work with component parts of medical equipment through disassembling and assembling the equipment.

RS 7 Installation of Medical Equipment
Floor plans (including lay-outs and roughing-in) and blue print reading.
Proper location of the x-ray and photofluorograph, physical therapy units, sterilizers, stills, operating room equipment, electrocardiograph, electroencephalograph, refrigeration units, and darkroom equipment.
Installation of protective materials and devices.
Proper location and size of water, steam and waste lines; electrical requirements for medical equipment units.
Uncrating, assembling, securing, testing and calibration of medical equipment.
Variation in procedures for ashore and afloat installations.
Practical work in assembling, installing, testing and calibration of medical equipment.

RS 8 Maintenance and Repair of Medical Equipment
Use of proper tools.
Cleaning and oiling of component parts of medical equipment.
Care of the finish of equipment.
Adjustments necessary in the routine maintenance of medical equipment.
Repair and/or replacement of parts of medical equipment.
Disassembling and repacking of equipment.
Procurement of equipment; identification of spare parts; use of catalogs.
Surveying equipment.
Practical work in adjusting, repairing and/or replacing of component parts of medical equipment.
Actual practice in all types of trouble-finding.
Reports required of repair units.

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